Claims

5   1.   A method for navigation inside a region of interest, for use in a radiography unit (100) including an X-ray source (104), recording means (103) facing the source, and a support (105) on which an object (106) to be radiographied, containing the region of interest, can be positioned, the method comprising the following steps:

a) acquiring three-dimensional image data of a volume V1 of the region of
10   interest;

b) calculating, at a time t, a two-dimensional projection image (IP, IP2, IP3) of all or part of volume V1 and/or a sub-volume (V2, V3, VR) of said volume V1 according to the position of the support (105), the position of the source (104) and recording means (103), a field of vision (FOV), a focal distance
15   (DF) and an object distance (DO);

c) optionally superposing to, or subtracting from to the projection image (IP, IP3) and/or to the sub-volume (V3, VR), according to a given plane section, a radioscopic image (IS1) associated with the positions of the support (105), of the source (104) and recording means (103), of the field of vision (FOV),
20   of the focal distance (DF) and object distance (DO), at time t; and

d) displaying on a display device an image (IR) and/or a volume (VRS) resulting from step c), and/or the projection image (IP, IP2, IP3) and/or the sub-volume (V2, V3, VR).

25   2.   A method according to claim 1, characterized in that step b) includes the following sub-steps:

b1) reading in the storage means of the radiography device a support position (x, y, z), a source and recording means position (α,β, γ) and the values of the field of vision (FOV), focal distance (DF) and object distance (DO); and

30   b2) calculating the projection image (IP, IP3) and/or sub-volume (V3, VR) according to the read parameters.

3.   A method according to any one of claims 1 and 2, characterized in that step b) includes the following sub-steps:

35   b1) reading in the storage means of the radiography device a support position (x, y, z) and a source and recording means position (α,β, γ);

b2) calculating sub-volume V2 of volume V1, according to these positions,

b3) reading in the storage means of the radiography device the values of field of vision (FOV), focal distance (DF) and object distance DO);

40   b4) calculating a corrected volume V3 of sub-volume V2 according to the field of vision (FOV), the focal distance (DF) and the object distance (DO); and

b5) optionally calculating the projected image (IP, IP3) on the basis of corrected volume V3.

45   4.   A method according to claim 3, characterized in that the corrected volume V3 is calculated as a geometric enlargement and a scaling according to the field of vision (FOV), the focal distance (DF) and the object distance (DO).

5. A method according to claim 3, characterized in that, during step b2), a projection image (IP2) of sub-volume V2 is also calculated according to said positions.

6. A method according to claim 5, characterized in that, during step b5), the projection image (IP, IP3) is generated by correcting the projection image (IP2) according to the field of vision (FOV), the focal distance (DF) and the object distance (DO).

7. A method according to claim 4 or 6, characterized in that the calculation of correction is performed by use of an enlargement geometrical function.

8. A method according to any one of claims from 3 to 7, characterized in that the calculation of sub-volume V2 comprises the following steps:

i) determining in volume V1 an incidence axis depending on the position (α, β, γ) of the source (104) and of the recording means (103) relative to a reference system of the radiography device, an origin of which is an isocenter of said radiography device;

ii) determining in volume V1 a center of sub-volume V2 depending on the position (x, y, z) of support (105); and

iii) calculating and reconstructing sub-volume V2 from volume V1 according to a reconstruction axis parallel to the incidence axis.

9. A method according to any one of claims 3 to 8, characterized in that the sub-volume V2 has dimensions nx x ny x nz which are defined by an operator.

10. A method according to any one of the preceding claims, characterized in that step a) includes the following sub-steps:

a1) acquiring of a set of sections through the region of interest; and

a2) reconstructing volume V1 in the form of a three-dimensional voxel matrix.

11. A method according to any one of claims 1 to 10, characterized in that step c) includes the following sub-steps:

c1) reading the radioscopic image IS1 in the storage means of the radiography device, and

c2) superposing said image on, or subtracting said image from the projection image (IP, IP3) and/or sub-volume (V3, VR) according to a given plane section of the radioscopic image IS1.

12. A radiography device, comprising an X-ray source, recording means facing said source, a support on which an object to be radiographied, containing a region of interest, can be positioned, characterized in that it comprises three-dimensional data acquisition means connected to the recording means, computing means and display means, said means being together arranged so as to perform the method according to any one of the preceding claims.